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14. ABSTRACT

The WDMET is the largest collection of detailed combat casualty injuries available to guide military medical planners. This project has coded some 7898 patient's injuries from over 3,000 combat incidents that are recorded in the WDMET into contemporary injury severity taxonomies including injury severity scoring. The result is that WDMET is now usable in a fashion that can relate to other contemporary injury databases, particularly the datasets that are being developed from the contemporary conflicts in Iraq and Afghanistan. This project has executed a fundamental step in furthering the understanding of the nature and severity of combat injury and thus, in its mitigation.

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Introduction

An essential prerequisite in preparing for war or other military combat is an understanding of the risks, nature and severity of likely injuries and of the medical resources required to treat them. Without a clear understanding of these elements, a mismatch of resources can result in the threat to life or limb, inappropriate logistic burden and mission failure. Comparison of contemporary data with data from previous conflicts is essential.

Prior to this effort the last combat database developed by the U.S. military of any significance is the Wound Data and Munitions Effectiveness Team (WDMET) database acquired in 1965-67 in Vietnam and representing less than 4% (N – 7989) of those injured or killed in that conflict. This database was not in a functional electronic format. The injury information had not been coded into useable injury taxonomies (ICD-9-CM and ICD-10-CM) and severity scales (AIS) for comparison with other databases. However, despite its many shortcomings, it formed the basis of much strategic tactical and logistic thinking in military medicine despite radical changes in armor, tactical settings and combat doctrine. U.S. conflicts since that time had resulted in small casualty numbers with little injury data for non-survivors as few complete autopsies were performed. Furthermore, casualty estimates, and consequently medical resources are currently often based on models created by individuals without combat knowledge or insight and modulated by assumptions and theories that could not be evaluated.

Although the tactical environment and protection have changed over the years, contemporary combat data has shown that the many weapons systems have not. Small arms fire, RPG's, grenades and IED's were common mechanisms of injury in Vietnam and are also the main mechanisms of injury in the current conflicts. What are the patterns and severity of injury in the WDMET and contemporary combat databases? No comparisons could be made nor any other such questions answered until the injury data in the WDMET database is coded in a usable format. The casualty injury data from the WDMET data provides a valuable research tool and legacy database which has yet to be adequately mobilized for the benefit of the combatant.

Background. The foundation for this proposal was laid in 2003-2004 as part of IECC contract number DAMD17-01-P-0485 to develop the International Early Conflict Care (IECC) database and prior to that under Special Operations Command (SOCOM) contract USZA22-00-C-0003 effective December, 1999.

These resources enabled the IECC to enter combat data from other established databases, including British, Israeli and U.S. Somalia and Panama conflict data into one standardized database format. Data for over 4100 casualties were collected, entered and coded into an Access format database. The data were validated and transferred to the master database at ISR, AMEDD, Fort Sam Houston, TX.

Coding of the injury data from WDMET which includes both survivors and non-survivors with autopsy data began during the IECC proposal. The current effort provided for the completion of the coding of the WDMET data into ICD taxonomies and AIS-98 severity codes thus making it possible to perform comparative or aggregate analyses with both civilian trauma registry data and contemporary combat data being acquired from Iraq and Afghanistan.

Body

OIF-OEF Combat Trauma Registries

Data are being collected for casualties of the current conflicts Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF). Data fields include descriptions of the tactical environment, the incident and individual combatant injuries and the care provided at the various stages from point of wounding through to field hospital and outcome. DOD provides funding for the Joint Theatre Trauma Registry (JTTR) and the Navy/Marine Combat Trauma Registry (CTR). The JTTR is based at the Center for AMEDD Strategic Studies (CASS) and the Institute for Surgical Research (ISR) at Fort Sam Houston, Texas. The CTR is based at the Naval Health Research Center (NHRC) in San Diego, CA. Both databases collect data on all casualties of OIF and OEF. The CTR focuses data collection on the earlier levels of care, while the JTTR focuses on data collection at the Combat Support Hospitals (CSH) and Level IV at Landstuhl, Germany. Level V data collection has recently begun at the National Naval Medical Center by the CTR and at Walter Reed Army Medical Center by the JTTR. The data fields for the JTTR and CTR were developed jointly and incorporate all the pertinent data fields from U. S. civilian trauma registries as well as specific incident, tactical and weapon data needed specifically for combat scenarios. Injury data for all Killed in Action (KIA) and Died of Wounds (DOW) casualties for OIF and OEF are being provided to the JTTR by the Office of the Medical Examiner at the Armed Forces Institute of Pathology and will be linked with the field data for the casualties. Data for approximately 7000 casualties have been entered into the JTTR to date.

JTTR and CTR data are being coded into the injury taxonomy ICD-9-CM. Injury severity scoring for JTTR and the CTR began in June 2005 using the recently published version of the Abbreviated Injury Scale (AIS) 2005. JTTR and CTR injury data coded in AIS 2005 is being mapped to AIS-98 to be comparable with other trauma data sets.

Military Injury Severity Scaling.

Howard Champion, Mimi Lawnick and a committee of military physicians have worked with the Injury Scaling Committee of the AAAM over the last two years to develop Military AIS severity codes in conjunction with the AIS 2005 revision. AIS 2005 was initially projected to be published in 2004, however, the revision was not completed until October 2005. The 2005 Military supplement was completed in June 2005. Injury data from OIF and OEF as well as the IECC and WDMET will

be the first combat injury data coded using this new scoring system. All combat injury data will be coded in both Military AIS as well as AIS -98 and AIS 2005 civilian versions. This will allow for comparisons of combat data with many other trauma databases.

Key Research Accomplishments

The overall Goal of this proposal was to complete the injury coding and severity scoring of the WDMET combat casualties.

Specific Aims:

1. Continue and complete the injury coding and severity scoring of the data for the 7898 WDMET casualties in ICD-9-CM, ICD-10-CM and AIS-98.
2. Code the injury data in AIS 2005 Military supplement when available.
3. Prepare analyses as appropriate.
4. Finalize guidelines for future access to the database.

Specific aim #1 has been completed. All injury data for the 7898 WDMET casualties has been coded in ICD-9-CM, ICD-10-CM and AIS -98. AIS-98 was the current version of AIS when coding of the WDMET database began.

Data for each of the 7898 casualties was formatted into a usable Access database by Dave Bengert at CASS, Fort Sam Houston, TX from the original file received from CCRC in Bethesda, MD. The access database contains all data relevant to abstracting the injuries from the WDMET database as well as an additional screen for entering and coding each injury. The original database was formatted for collection of munitions and wound data, not as an injury database. Injury data was entered under many different sections of the WDMET database. Injury descriptions were listed under the wounding agent reports, the individual wound track reports, the autopsy report, the clinical data section, the burn assessment report and three sections of the medical evaluation and treatment record. The coders reviewed each record and entered each injury description into the diagnoses fields. Then each injury was coded in ICD-9-CM, ICD-10-CM and AIS-98. The software automatically calculates an Injury Severity Score (ISS) for each casualty which is stored in the database. A number of cases had no injuries listed in the WDMET database therefore the total number coded is less than the total number in the WDMET database.

Specific Aim #2. AIS 2005 was not published until October 2005. The Military supplement was finalized in June 2005, prior to the final printing of AIS 2005. Therefore, it was not possible to code the WDMET database in AIS 2005 under the timeframe of this project. However, a mapping has been developed by Mimi Lawnick, which assigns the appropriate AIS 2005 and Military 2005 codes to each AIS-98 code. This mapping will allow for the WDMET and IECC databases to be updated to AIS 2005 and Military 2005. Supplemental funding has been requested to complete the computerization of this AIS 2005 mapping to the WDMET and IECC databases.

Specific aim #3 is in process. The WDMET database is available for comparative analyses with other combat databases. Since less than 3000 JTTR casualty records are coded in AIS, no joint analyses have been performed to date. ISR is heading efforts to complete the coding of an additional 3000 casualties in JTTR over the next few months. Analyses are planned on JTTR and the combined dataset for early 2006.

Specific aim #4 has been completed. The computerized and coded version of the WDMET database will reside at ISR. Access to the data will be controlled by COL John Holcomb, Commander of ISR who also oversees access to the JTTR. Requests for access to WDMET reports or data will be reviewed and approved by COL Holcomb and provided by ISR IT personnel.

Reportable Outcomes

Summary:

The WDMET is the largest collection of detailed combat casualty injuries available to guide military medical planners. This project has coded some 7898 patient's injuries from over 3,000 combat incidents that are recorded in the WDMET into contemporary injury severity taxonomies including injury severity scoring. The result is that WDMET is now usable in a fashion that can relate to other contemporary injury databases, particularly the datasets that are being developed from the contemporary conflicts in Iraq and Afghanistan, for contemporary analyses. This project has executed a fundamental step in furthering the understanding of the nature and severity of combat injury and thus, in its mitigation.

Products:

1) WDMET data coded in AIS and ICD making it usable to researchers.
2) Mapping of the AIS -98 data to AIS 2005 and Military AIS 2005.
3) Integration with process of current trauma data collection including JTTR, CTR and the National Trauma Data Bank (NTDB).
4) Presentations:
    - Intra-Agency Institute for Federal Health Care Executives (105th April 2004, 106th, October 2004, 107th, April 2005 108th , Oct 2005), "Trauma – A Modern Epidemic", Washington DC, Howard R. Champion
    - Special Operations Medical Conference (Dec, 2005), "Combat Casualty Care Research", Tampa FL, Howard R. Champion
    - DARPA Conference, Electronic Database/Medical Record, Arlington VA, September 2005
5) Copyright mapping – Most trauma registries are currently coded in AIS -98. Manually recoding these databases in AIS 2005 would be an extensive and time consuming task. Recoding can be accomplished with a

computerized mapping of all AIS-98 codes to AIS 2005 codes. However, there is not a one to one match of codes. A number of AIS 2005 codes require the AIS-98 code and one or more ICD-9-CM codes in order to assign the correct AIS 2005 code. This mapping was not provided by AAAM with the 2005 revision despite discussions by the International Injury Scaling Committee (IISC) regarding the importance of providing such a mapping. This mapping was developed under this proposal. Obtaining copyright protection for this mapping is currently being pursued by the authors.

Conclusions

This proposal has completed the coding of the WDMET combat casualty database for use as a reference legacy database. WDMET is now available in a usable format for extrapolation of data, comparisons with other datasets, and outcome analyses with injury severity scoring. This is an important step in advancing military medicine. It fulfills a distinct and pressing need for reference combat injury data to compare with contemporary combat survivor and non–survivor injury data.

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